Late driveline left ventricular assist device infection treated with frozen-and-thawed allogeneic platelet gel

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A 56-year old man with a history of ischaemic cardiomyopathy was referred to our unit to undergo LVAD implantation in October 2011. A Heartware-HVAD (HeartWare, Inc., Framingham, MA, USA) was implanted through a median full sternotomy with the help of cardiopulmonary bypass. The driveline exit site was located in the right lateral thoracic wall, at the level of the sixth intercostal space along the lateral mammary line. The post-operative course was uneventful and the patient was discharged home 3 weeks later. He was followed monthly at the outpatient cardiac failure clinic and his clinical conditions, LVAD parameters, blood samples and driveline exit site were carefully monitored. Routinely, pump exit site care was performed every 24-48 h always using an aseptic technique. The exit site and the driveline were carefully inspected to observe accidental torsion, kinking and skin abrasion. Then, both the exit site and driveline were cleaned with a diluted chlorhexidine scrub solution and finally dressed. Fifteen months after LVAD implantation, the patient experienced an infection of the driveline exit site with drainage and erythema around the driveline and local pain. There was no evidence of fever or other signs of major infection. Swab culture showed the growth of Pseudomonas aeruginosa and an intravenous antibiotic therapy tailored to culture results (cefazidime 2 g three times daily and amikacina 1.5 g daily) was promptly started and continued for 14 days. Despite the antibiotic therapy, local infection showed no signs of improvement (‘butterfly’ shape; Fig. 1A). Thoracic computer tomography (CT) scan was performed to delineate the extension of infection and this was located only at the superficial level and not into the deeper structures. The surrounding tissue of subcutaneous segment of the driveline was free from infection. At that point, intravenous antibiotic therapy was stopped and no oral antibiotic medications were administered. The decision to suspend antibiotic therapy was taken consequently to the absence of any infection of the deep tissues as seen on the CT scan. On the basis of our experience with PLT-gel in the treatment of skin infections [2], we decided not to treat the infection with other strategies, such as dressing with antibiotic-impregnated gauzes. The wound was dressed with PLT-gels (Fig. 1B). Methods for producing PLT-gels have already been described [2]. In brief, PLT concentrates were divided into 15-mL sterile Falcon tubes, centrifuged at 1100 × 106–2050 × 106/μl to prepare PLT-rich plasma (PRP). PLT-gels were prepared at room temperature by adding 2.5 ml of PRP, 800 μl of allogeneic group AB fresh-frozen plasma and 350 μl of 10% calcium gluconate, with gentle mixing in 3.5-cm sterile Petri dishes. Gels formed in the dishes after 50 min were sealed with low temperature-resistant adhesive tape and frozen at −80°C in a mechanical freezer. The gel was removed from the freezer about 30 min before performing the dressing. The time of defrosting at room temperature was ≏20 min. Once thawed, the gel was applied under sterile conditions on the driveline exit site. Wound dressings with PLT-gel were changed every 3–5 days and the treatment was repeated five times for a total period of 4 weeks. PLT-gels were...
frozen and stored in single sterile dishes at $-80^\circ$C. Thawed PLT-gels were applied in a sterile fashion within 30 min. During the period of treatment, no adverse effects, such as local rush, were observed and systemic infection parameters, such as white blood cell count, C-reactive protein and procalcitonin, were always in the normal range. Once the skin infection was completely resolved (Fig. 2A), the exit site was dressed as at the beginning. At the last follow-up after 9 months (February 2014), no recurrence of infection was observed (Fig. 2B). Topical wound treatment was performed at the outpatient wound care clinic.

COMMENT

Infections of the driveline exit site represent a life-threatening complication in patients supported by LVAD. If not promptly recognized and accurately treated, percutaneous local infection can migrate towards the pump machine and the risk of mortality dramatically increases. In such a critical scenario, urgent LVAD replacement or transplantation has to be considered as a therapeutic option [3]. Incidence of driveline exit site infections is dramatically reduced in the era of continuous-flow devices, ranging from 9.8 to 23% [4]. This positive trend is probably due to miniaturized continuous-flow devices with a smaller and thinner driveline compared with pulsatile-flow devices. Currently, there is little literature regarding the field of exit line wound care, and no standard protocols have been defined and published.

PLT-gels are routinely used in our unit to manage postoperative local skin infection, such as dehisced sternal incisions and post-saphenectomy wounds.

PLT-gels release PLT-derived growth factors, transforming growth factor-$\beta 1$ and vascular endothelial growth factor [2]. The high concentrations of growth factors released during PLT-gel application can be delivered to fibroblasts, mesenchymal cells and stromal cells to enhance wound healing, triggering cell proliferation and performing an antimicrobial action. All these mechanisms could be the cause of the gradual improvement of the infection that was not seen when the patient was treated with intravenous antibiotic therapy.

It is common evidence that one of the major causes of driveline exit site infections is local trauma [4, 5]. Therefore, it should be recommended to avoid torsion and wide mobility of the driveline, which is more frequent in young active patients. Probably, the reduced size and the reduced rigidity of the driveline can contribute to further reducing the rate of local infection. Obviously, the complete elimination of external driveline could confer more comfort to patients with LVAD and could dramatically reduce the rate of LVAD-related infections.

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REFERENCES


